

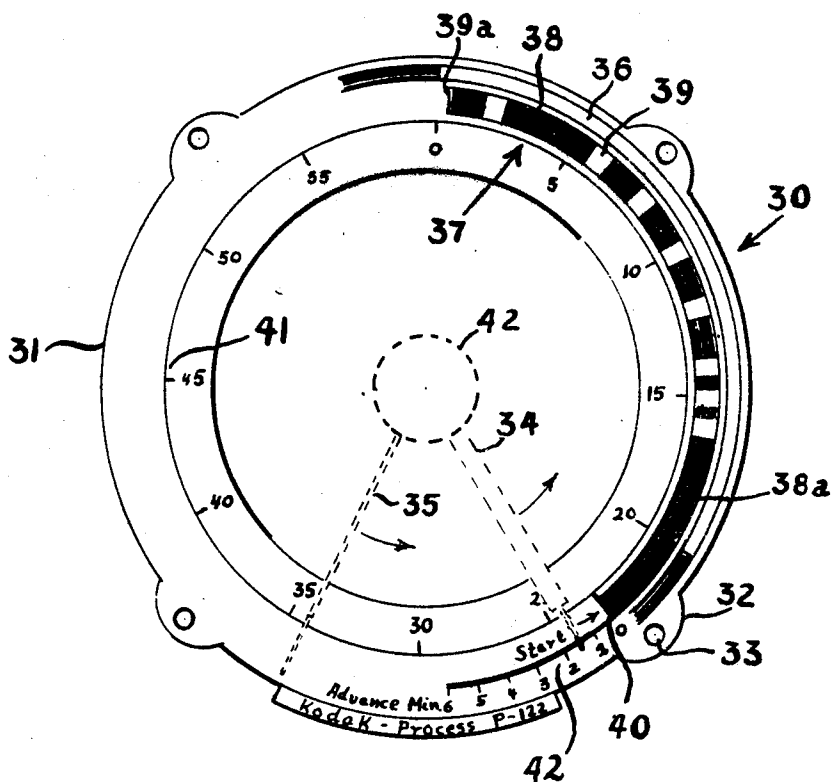
[72] Inventor **Werner W. Buechner**
4407 Gladding Court, Midland, Mich.
48640
[21] Appl. No. 677,266
[22] Filed **Oct. 23, 1967**
Continuation-in-part of Ser. No. 302,902,
Aug. 19, 1963, Patent No. 3,349,685,
621,382, Jan. 23, 1967, now pending
[45] Patented **Dec. 22, 1970**

[56] **References Cited**
UNITED STATES PATENTS
2,584,374 2/1952 Wickstrom..... 58/126X
3,081,688 3/1963 Palmer..... 95/89
Primary Examiner—John M. Horan

[54] **COLOR PROCESS TIMER**
15 Claims, 3 Drawing Figs.

[52] U.S. Cl..... 95/89,
58/126
[51] Int. Cl..... G03d 3/00,
G04b 19/28
[50] Field of Search..... 95/89;
58/126

ABSTRACT: A timer comprising a minute and a second hand is provided with tracks of visually or optically distinct areas which represent approximately the drainage steps and the treating and washing steps of a photographic color developing process and with a track of distinct areas representing exactly the drainage steps. By visual observation of the relative positions of the minute and second hand to the said areas, the begin and end of each treating, washing and drainage step is determined with an accuracy of a second or fraction thereof.



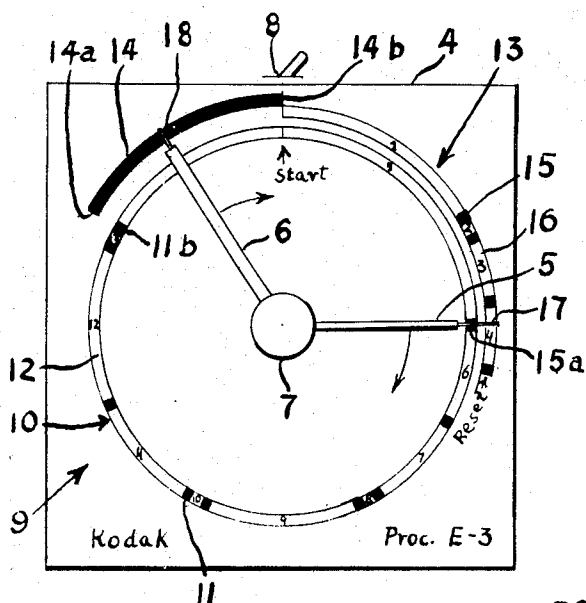


FIG. 1

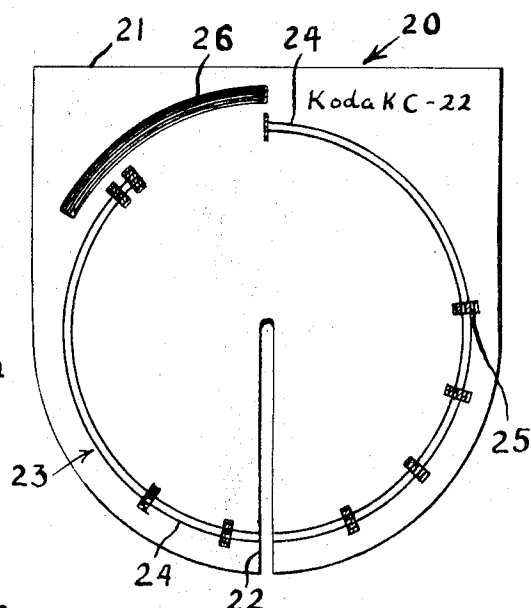


FIG. 2

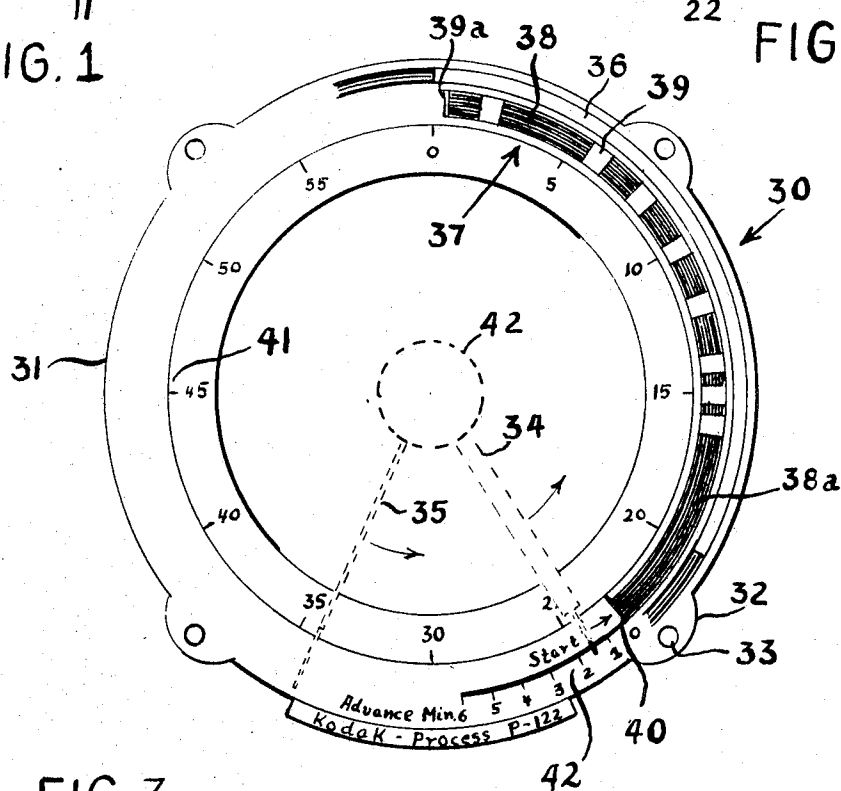


FIG. 3

INVENTOR.

Werner W. Bredner

COLOR PROCESS TIMER

This application is a continuation-in-part of my copending application Ser. No. 302,902 filed Aug. 19, 1963 and entitled "PROGRAM TIMER" now patent No. 3,349,685, and of my copending application Ser. No. 621,382, filed Jan. 23, 1967 and entitled "PROGRAM TIMER."

The present invention relates to a timing device for the timing of the steps of photographic treating processes and more particularly to a timing device which permits to determine, by visual observation of the dial of the timing device, the begin and end of each step including each drainage step.

In my applications Ser. Nos. 302,902 and 621,382 is described and claimed timing mechanism which utilizes for the timing of multistep photographic processes, especially of color processes the concept of utilizing for the timing the exact points of time of the begin and end of the drainage steps occurring between treating steps. The said timers comprise means for programming the successive steps and functions of a multistep photographic process, such that by the use of contact and counter contact means the state of energization of one or more primary electrical circuits is changed exactly at the begin and end of each drainage step and of each chemical treating and washing step of the photographic process. In the embodiments of the timer, using dial type carriers for the contact means, the progress of the treating schedule and the begin and end of each step may be visually observed. By utilizing an arclike auxiliary contact or area in cooperation with a second rapidly traveling hand, the exact point of the begin or end of each step may be visually observed. This has been utilized in some of the embodiments of the timers disclosed in the said applications, to provide a separate dial, containing no electrical contacts, for visual observation of the progress of the process.

It is an object of the present invention, to provide timing device which is programmed to a given photographic color developing process, in which the begin and end of each step is determined solely by visual observation of the dial or other carrier means.

It is another object of the invention, to provide simple, inexpensive timing mechanism for the timing of the begin and end of each step, including the drainage steps, of photographic color processes.

Another object of the invention is the provision of means, which permit, by attachment to the dial of conventional timers, the conversion of such conventional timers to a program timer for any desired photographic color developing process.

Other objects of the invention will become apparent from the following description of the invention and from the attached drawings, in which:

FIG. 1 is a schematic front elevation of a timer comprising a dial with visual programming means for a color developing process;

FIG. 2 is a schematic top elevation of an exchangeable dial face, for use with timing device, which dial face permits the visual programming of a conventional timer to any desired photographic color developing process; and

FIG. 3 is a schematic top elevation of a dial ring, for exchangeably fastening to the dial of a conventional timer comprising a minute and a second hand.

Referring now to FIG. 1 of the drawings, the novel timer comprises a housing 4, minute hand 5, second hand 6, knob 7 for setting of the hand 5 and/or 6, driving means (not shown) for rotatively driving minute hand 5 at 1 r.p.m. and second hand 6 at 1 r.p.m., both hands rotating clockwise in the direction of the arrows, ratchet and clutch means (not shown) for permitting the manual setting of both hands 5 and 6, and on-off switch 8, for starting and stopping said driving means.

The dial 9 is programmed to Kodak Process E-3 for the development of certain types of Ektachrome film materials by the reversal method. The total duration of this processing schedule is longer than 1 hour and requires therefore the breaking up of the time schedule, into two parts. In order to accommodate this process, two tracks are provided, one for

each part, containing distinct sections corresponding in their peripheral length (or angle, respectively) approximately to the length of the treating steps, (chemical treating steps and washing steps) and to the drainage steps, respectively. Dial 9 comprises accordingly, in this particular embodiment of the timer, an inner track 10 of dark areas 11 and light areas 12. Concentrically with track 10 is provided a second track 13 which covers only a small part of a circle. Concentrically to tracks 10 and 13 is a third fully circular track of one arclike long dark area 14 and the remaining part of a circle filled by a light area (not marked). The dark areas 11 and 15 are relatively short, representing an angle covered by the minute hand in somewhat longer time than the actual duration of the drainage steps between treating steps. In this particular embodiment of the timer, programmed for Process E-3, the drainage steps between treating steps are 10 seconds, representing an angle of 1°, (based on the rate of travel of the minute hand). To provide for inaccuracies in the positioning of the minute hand at any one time, the dark areas 11 and 15 are made longer, by 1° at each side, such that they correspond to a time value of 30 seconds. The dark areas are spaced such, that the white areas 12 and 16 represent approximately the duration of the treating steps, (chemical treating and washing steps, as the case may be) minus the drainage time of 10 seconds (1°) at the end (clockwise direction) and minus the extensions of 1° (10 seconds) given to the dark areas 11 or 15, respectively. Of course, the 1° (10 seconds extension) of the dark area on the far side (in clockwise direction) is subtracted from the begin of the white area where applicable. Thus, each white area (with the exception of the first) covers an angle corresponding to the total time of the treatment time, it represents, minus 30 seconds. Thus, as the minute hand travels around the dial, its free end or pointer 17, respectively, stands over the white area as long as the treating step represented by the white area, is to proceed. At about the time, that the photographic material is to be removed from the respective treating station and to be held for drainage, before it is inserted into the next treating station, the free end of the minute hand moves over one of the dark areas 11 or 15, indicating the fact that removal of the treated photographic material from the treating station, wherein it is contained, and drainage is due. The exact point of time, at which the photographic material is to be removed for drainage and the exact point of time of reinsertion into the next treating station, is indicated by the dark area 14 in the outermost track. Second hand 6 makes a 360° sweep every 60 seconds. Since the drainage time is to be exactly 10 seconds, and is to be deducted from the end of the preceding treating step (treatment still goes on during drainage), the dark area 14 is placed to the left of the starting or zero position and is made exactly 60° long (corresponding to 10 seconds). Thus, the exact point of begin of the drainage period is indicated, when the free end of second hand 6 moves over the edge 14a at the left of dark area 14 and the material is held for drainage as long as pointer 18 moves over dark area 14, and is reinserted in the next treating station exactly at the point of time, that the free end or pointer 18 of hand 6 moves over end 14b of dark area 14 at the right (in the zero or 12 o'clock position).

For the operation of the timer, the operator sets both the second hand 6 and the minute hand 5 to the zero position (or start position) in the 12 o'clock position of the dial and holds the film ready for insertion into the first treating station. (First developer). At the same moment, at which he inserts the film into the developer, he throws the switch 8 to start the timer running. He observes the minute hand 5, and when its pointer 17 has moved close to or over the dark area at 15, he observes the travel of second hand 6. When pointer 18 of the second hand stands over edge 14a of dark area 14, he removes the film from the first developer, holds it for drainage in the prescribed manner, and inserts it into the second treating station, (running water) when pointer 18 moves over edge 14b of arclike dark area 14. As soon as pointer 17 moves close to or over the second dark area in track 13, he observes the pointer

18 of the second hand. When it stands over edge 14a, he removes the film from the second treating station, holds for drainage until the pointer 18 passes over edge 14b of dark area 14, when he inserts the film into the next treating station, and so forth until the material has been passed through step 4 of process E-3 (wash). He then removes the film from the washing station, stops the timer by throwing switch 8, resets the timer to the starting or zero position, as before, and subjects the film to the reversal exposure in the usual manner.

Thereafter, the operator holds the material ready for insertion into the fifth treating station (color developer) and starts the timer by throwing switch 8 exactly at the moment that he inserts the film in the color developer (step 6). He leaves the film in the color developer, until pointer 17 moves over dark area 11a in inner track 10 and pointer 18 moves over edge 14a of dark area 14, holds it for drainage, inserts into the next treating station, when pointer 18 moves over the edge 14b and so forth, until all treating steps have been completed, when pointer 17 has moved over dark area 11b and pointer 18 moves over edge 14a.

In the just described manner, processes having a duration longer than 60 minutes can be conveniently programmed on a full circular or 360° dial of a timer, having a 1-r.p.h. minute hand. If the timer is made very large, e.g. 20 inches diameter of the dial, or, if the timer is operated at less than 1 r.p.h. of the main hand, the second hand 6 may not be needed, because on large dials or at slower speeds, the accuracy of the indication of the minute hand may be good enough to satisfy the needs of most color processes. However, the convenience of using a 1-r.p.h. second hand and the very great increase in accuracy by a factor of 60° render the just described embodiment the preferred timer for all around use.

The drainage steps are shown in the FIG. 1 as dark areas. This arrangement is preferred, when the timer is lighted (e.g. by safelight filtered light). In this case, it is beneficial, to give the pointer 17 a light color or make it reflective. Alternatively, the drainage steps may be represented by reflective areas representing the treating steps. Many film developing processes, such as Process E-3, are carried out, in the first part, in total darkness, if the film is not contained in lighttight containers. In this case, it is preferred, that the steps are represented by alternating luminescent or phosphorescent areas and nonluminescent or phosphorescent areas, preferably such that the drainage steps are represented by the luminescent areas, or if desired, narrow and wide luminescent or phosphorescent areas may alternate to represent alternatingly the drainage and the treating steps. The pointers are, in this case, also luminescent, at least in part, so that the relative positions of the minute hand and second hand in relation to the programmed areas can be readily determined by visual inspection. Other means may be used, to provide visually or optically distinct areas for the treating (chemical treating and washing steps) and for the drainage steps. The areas representing the drainage steps may be transparent and backlighted (e.g. made from safelight filter material for the photographic material, and the areas representing the treating steps are opaque or vice versa the areas representing the treating steps may be transparent or translucent). The areas representing the drainage steps may also be provided as the ends of plastics which are capable of guiding light along their interior. Alternatively, the whole track assembly may be made from such plastic, with the light introduced at one point, and all areas, which are to be dark, covered by an opaque layer of suitable material or paint etc. such that only one kind of areas is lighted up. Other means well known to produce optical or visual distinction may be used in similar manner to produce the tracks of alternating visually or optically distinct areas.

Instead of programming the timer to Process E-3, it may be programmed to any other desired photographic process, including Kodak's Process CP-5. An example of programming this process is given in my copending application Ser. No. 677,265 and the visually programmed dial may have a general appearance as represented in FIG. 17 of that application or in

suitable adaptation to the purposes of the present invention, serving as an example of programming several functions in different tracks. The dial in FIG. 17 of said copending application may be made to be more accurate by adding another track, comprising a dark area, indicating the 5-second drainage time as explained hereinbefore. If the timer has a 1-r.p.m. second hand and drainage periods may occur at 30-second intervals, the track cooperating with the second hand may contain two distinct areas, indicating the exact drainage time.

Instead of providing separate timers for each process to be practiced, it is more economical to adapt an existing timer, such as the commercially available darkroom timer, e.g. the timer sold under the trademark "GRA-LAB," Universal Timer, Model 168, to be used as a visual program timer. In this case, it is only required to substitute one or more exchangeable dials for the conventional dial. An example of an exchangeable dial is illustrated in FIG. 2. The dial face 20 comprises a thin sheet 21 of material, e.g. of metal, plastic, cardboard etc., having a rectangular top and a half circular bottom. In the lower portion is provided slot 22, of a width to permit slipping the dial 20, by slot 22 over the shaft of the timer. On the dial is provided an inner track 23 of visually distinct alternating areas, representing the treating and drainage steps of a photographic color process (Kodak C-22), having drainage steps of 10 seconds. The treating steps are represented by narrow, reflective areas or arcs 24 and the drainage steps by wider, nonreflective areas 25. As before, one kind of the areas may be made luminescent, or phosphorescent etc. The dial 20 is programmed for use in a timer in which the hands (a minute hand at 1 r.p.h. and a second hand at 1 r.p.m. move clockwise, i.e. toward the right, if viewed from the front. Accordingly, the outer track, containing the arclike dark area 26 for determining the exact begin and end of the drainage period by the second hand, is provided at the left of the 12 o'clock position.

For the operation of the timer, the exchangeable dial 20, being programmed for the photographic process to be timed, is slipped into channellike or slotlike holding means, contoured in accordance with the shown outline of the exchangeable dial and contained in or at the timer (not shown). The hands of the timer are then set to the starting position (both in 12 o'clock position) and the timer is started at the point that the photographic material is inserted into the first treating station. The material is removed, held for drainage, inserted in the next treating station etc., as described hereinbefore.

The exchangeable dial or dial face may have any other desired shape, outline and size as is convenient to suit the timer with which it is used. If desired, the inner circular area of the timer may be spared out, so as to expose to view the dial of the timer showing the numerals and subdivisions of the original timer, so that the timer may be used both as program timer and as a regular timer, e.g. for the timing of exposure. Any other means for removably holding the dial face on the timer may be used.

Instead of using as exchangeable dial face, one may employ also an exchangeable dial ring, such as is illustrated e.g. in FIG. 3 of the accompanying drawings. Dial ring 30 comprises a flat ringlike body 31, made from thin, sheet material, e.g. metal, plastic or cardboard, e.g. by cutting or stamping. The ring is provided with ears 32, each having a hole 33 for fastening the ring on the timer face e.g. by the use of screws, thumb-screws or slipon pins etc. The minute hand 34 (1 r.p.h.) and the second hand 35 (1 r.p.m.) of the timer are indicated by broken lines. The timer is programmed for Kodak Color Developing Process P-122 for use in a timer, in which the hands move counter clockwise as indicated by arrows. The outer track contains one arclike light 36, as described before, for cooperation with the second hand 35 to indicate visually the begin and end of each drainage period. The second track 37, covering a partial circle, contains alternating dark or non-reflective areas 38, representing the treating steps and light or reflective areas 39, representing the drainage steps. As

described hereinbefore, the light areas are made somewhat longer, in the direction of the periphery of the circle (corresponding to a larger angle), than corresponds to the actual lengths of the drainage steps, and the areas 38 representing the treating steps are made correspondingly shorter in the direction of the periphery. The first treating step (development) is represented by dark area 38a and the last drainage step is represented by light area 39a, so that the timer comes to rest with both hands in the 12 o'clock position, where it may shut itself off, as is the case with the above-mentioned "GRA-LAB" timer.

The operation of the timer is as described before. The operator sets the minute hand 34 to the 12 o'clock position and starts the timer by throwing the on switch, when he inserts the photographic material, using the directions of the timer for drainage, removal and insertion as described hereinbefore, until he has completed the last step, (drainage step) when the timer shuts itself off.

Sometimes it is desired to prolong the treatment of second and successive batches of photographic material to prolong the treating time in the first developer by a certain time increment. The timer, comprising the dial ring of FIG. 3 is adapted to provide this time increase by help of divisions in seconds provided on the scale 41, representing the third track (showing the numerals 5 to 55 in counterclockwise arrangement). To provide, for instance, a time increase of 55 seconds, the operator sets the minute hand to the starting mark 40 and turns, by knob 42, the second hand clockwise, to the mark at the numeral 55 on the third track 41. He then starts the timer for development and proceeds as described hereinbefore. If the time increase is longer than 60 seconds, the operator utilizes the short scale 42 at the lower right, which is divided in sections, each representing one minute of travel of the minute hand and marked by numerals 1 to 6. To prolong the treatment time in the first developer, for instance, by 1 minute and 34 seconds, the operator sets the minute hand at numeral 1 on scale 42 and turns second hand 35 clockwise to the mark indicating 34 seconds, as shown in FIG. 3, whereby minute hand 34 is moved about to the position as shown, (between numerals 1 and 2). When the operator starts the timer at the insertion of e.g. exposed enlarging paper into the developer, he will achieve a development time 1 minute and 34 seconds longer than is standard, by just following through with the observation of the hands or pointers, respectively, provided at their free ends and their relative positions to the areas, representing the drainage periods in the manner described hereinbefore.

In the foregoing, the timer has been described as comprising a permanent or exchangeable dial face, comprising full or partial circular tracks of alternating optically distinct areas. The timer may also be constructed in such manner, that the tracks of said optically distinct areas, representing the treating and drainage steps, are provided on traveling belts, in a manner, as described e.g. in my application Ser. No. 621,382, using e.g. the perforations shown therein with back-lighting of safelight, filtered light, and a stationary pointer or marking needle or the like. Alternatively, the tracks may be printed, or provided in any other manner as visually distinct zones or areas on the belt, or they may be provided on rotating discs or drums or on any other desired carrier as shown by way of example of contacts or perforations in various embodiments of the timer in my copending application Ser. Nos. 302,902 and Ser. No. 677,265.

Many changes and alterations may be made and the various features described herein and in said copending applications may be recombined to produce new embodiments of the timer of the present invention, as may come readily to mind. The hands may rotate at lower or higher speeds, than shown hereinbefore, and any other manner of providing the tracks of the visually or optically distinct areas may be employed.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is understood, that the invention is not

limited to the specific embodiments thereof, except as defined in the appended claims.

I claim:

1. Timing mechanism for the timing of multistep photographic wet-treating process, comprising time-indicating means and at least one track of visually or optically distinct, alternating areas, representing alternatingly and successively the lengths of the treating and drainage steps of a photographic wet-treating process, wherein said tracks of visually or optically distinct areas is provided on an exchangeable carrier, such that a given timer may be readily programmed to any one of a multitude of different photographic wet-processing schedules by merely substituting the respective carrier, which is programmed to said process, and wherein said alternating areas are arranged such that the relative position of the time-indicating means to said alternating visually or optically distinct areas serves as an indication of the begin and end of each drainage step and treating step, respectively.

2. The timing mechanism of claim 1, wherein the time indicating means are a minute hand and second hand, rotatively driven by driving means, and the visually or optically distinct alternating areas are arranged in at least one circular track, so that the relative position of the hands over said track serves as an indication of the progress of the process schedule of said photographic multistep process.

3. The timing mechanism of claim 2, wherein at least one track is provided, which cooperates with the minute hand, and in which the visually or optically distinct areas are arranged and proportioned such, that one kind of the areas, representing the drainage step, is peripherally slightly longer, than corresponds to the actual time of the drainage step, and at least a second track is provided cooperative with the second hand, which comprises a long arclike area exactly corresponding in time value to and representing the actual drainage step, such that the position of the traveling second hand over the near edge of said arclike area, indicates exactly the end of a treating step and the begin of a drainage period, and its position over the far edge indicates exactly the end of the drainage period and the begin of the next treating step.

4. The timing mechanism of claim 1, in which the tracks of visually or optically distinct areas are provided on an exchangeable dial face to be attached to the timing mechanism by holding means.

5. The timing mechanism of claim 1, in which the tracks of visually or optically distinct areas are provided on an exchangeable dial ring; and means for attaching said dial ring to the face of said timing mechanism.

6. The timing mechanism of claim 2, which comprises an adjuvant track of divisions of the time of travel of the second hand and cooperative with the second hand and an adjuvant short scale, of divisions of the time of travel of the minute hand and cooperative with the minute hand, so as to permit the timing by visual observation of extended periods of treatment in the first treating step of the process schedule.

7. The timing device of claim 1, which comprises auxiliary track and time-indicating means cooperating at an increased relative speed, so as to increase the accuracy of the timer by a factor corresponding to the increase in relative speed.

8. The timing device of claim 1, which comprises in addition means for indicating on a given track an extended treatment time in the first treating step of the process schedule.

9. The timing mechanism of claim 1, wherein said areas, representing either the treating steps or the drainage steps are provided with a luminescent material and the areas representing the other type of steps is nonluminescent.

10. The timing mechanism of claim 1, wherein the areas representing the drainage steps between treating steps are of light color, and wherein the areas, representing the treating steps are of dark color.

11. Exchangeable timer face for the instant programming of a timer, having movable time-indicating means, to the time schedule of the steps of a multistep photographic wet-treating process, having treating and drainage steps of different length,

which timer face comprises a face portion and means for holding the timer face on said timer, said face portion comprising at least one track of visually or optically distinct areas, successively representing the steps of said process, each area having a length in the direction of relative travel of said time-indicating means, which corresponds approximately to the time of duration of the respective step represented by said area, wherein the area representing each drainage step is visually or optically distinct from the areas representing the preceding and succeeding treating steps, and wherein said visually or optically distinct areas are arranged for cooperation with said time-indicating means, when the exchangeable timer face is contained on said timer.

12. The timer face of claim 11, wherein the said visually or optically distinct areas are arranged in at least one circular track for cooperation with the minute hand of a timer so equipped, when the device is contained on said timer.

13. The timer face of claim 11, wherein a central circular portion is cut out.

14. The timer face of claim 11, wherein the areas representing the drainage steps are made longer, in the direction of relative travel of said time indicating means, than correspond to the actual time of the drainage steps, and the areas representing the treating steps are correspondingly shorter, and at least one second track being comprised on said face, which second track comprises at least one long arclike area exactly corresponding in time value to and representing the actual length of duration and time of said drainage step, when it cooperates with the second hand of the timer, said arclike areas being dimensioned and positioned for cooperation with the second hand of a timer so equipped, when the device is contained thereon.

15. The timer face of claim 11, wherein said areas representing the drainage steps are luminescent, and the areas representing the treating steps are nonluminescent and of dark color.

20

25

30

35

40

45

50

55

60

65

70

75